

Figure 1

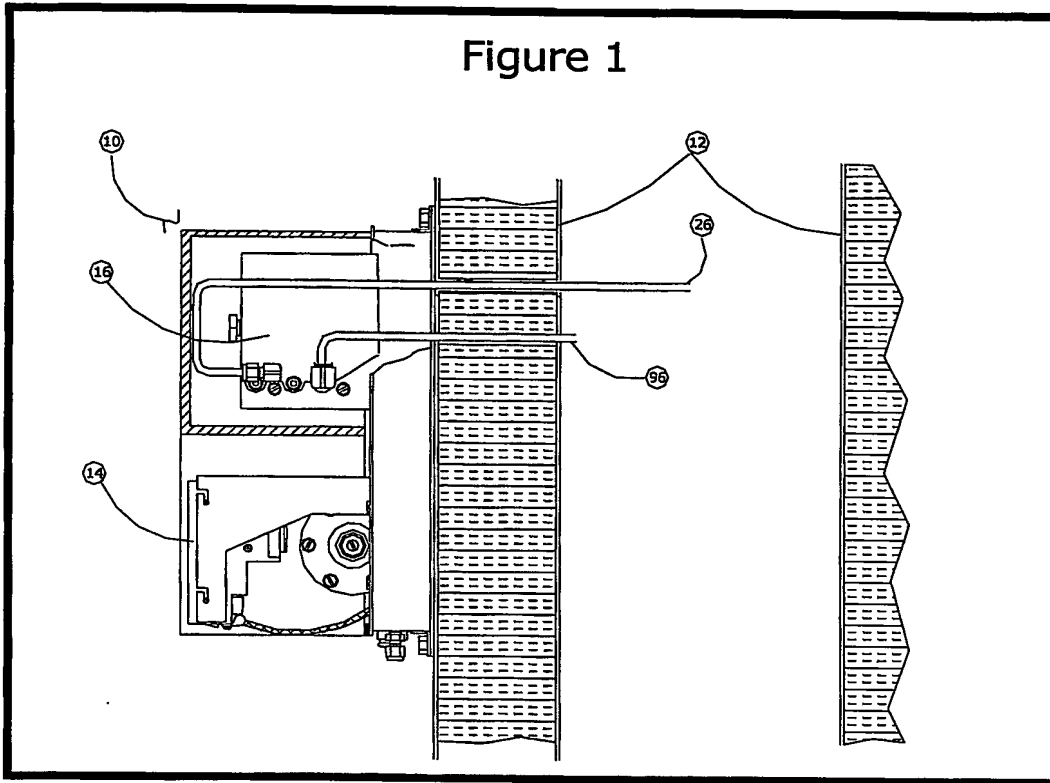
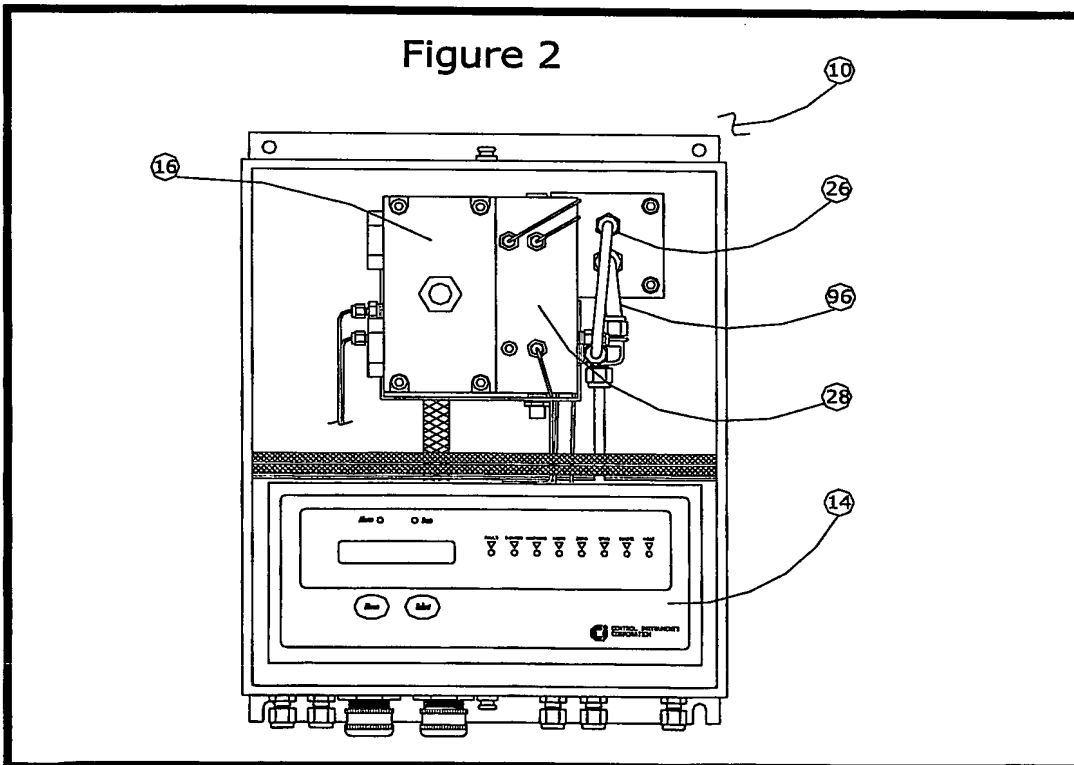


Figure 2



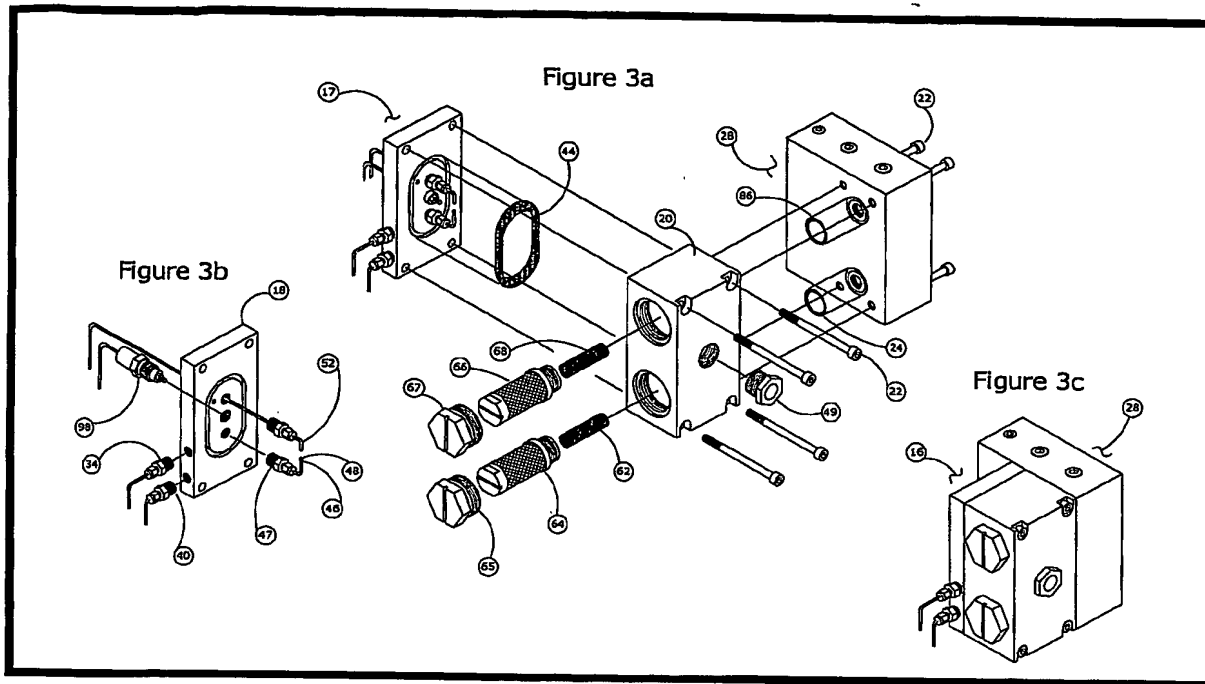


Figure 4a - Prior Art FTA Analyzer

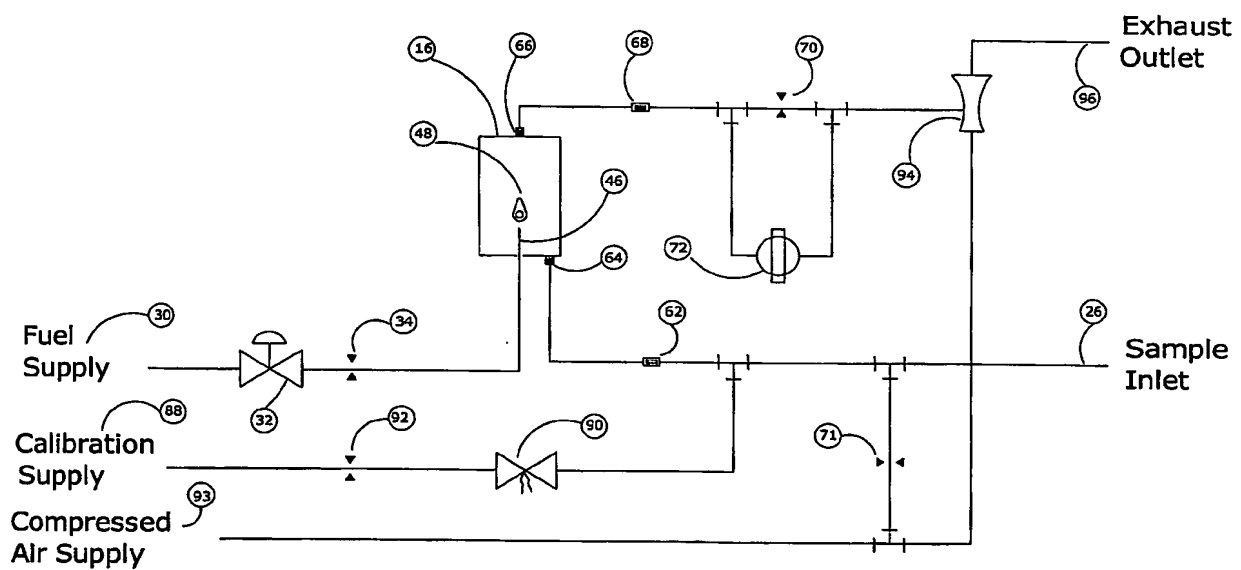


Figure 4b - FID Type Analyzer

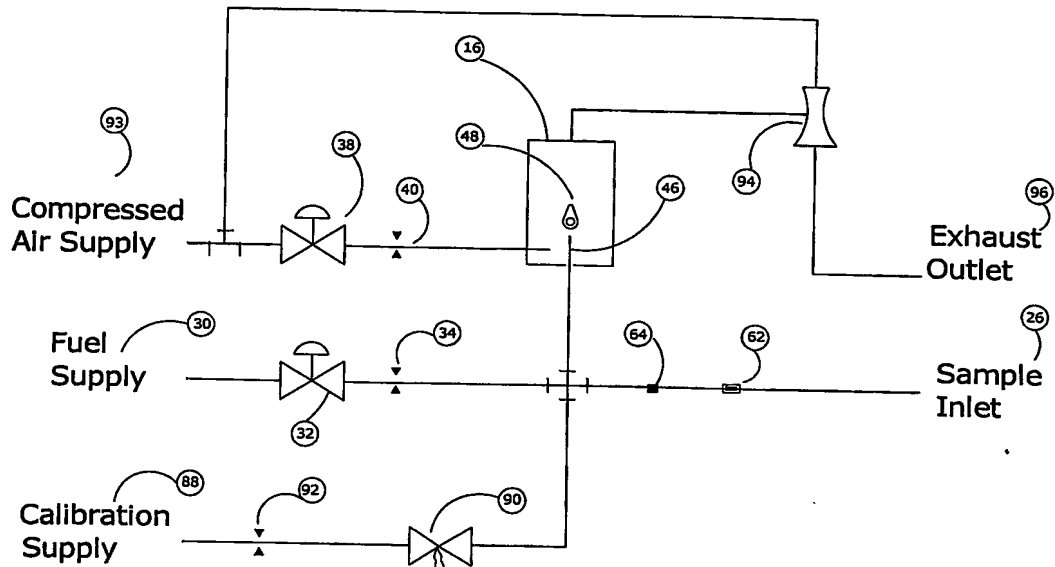


Figure 4c - Improved FTA Analyzer

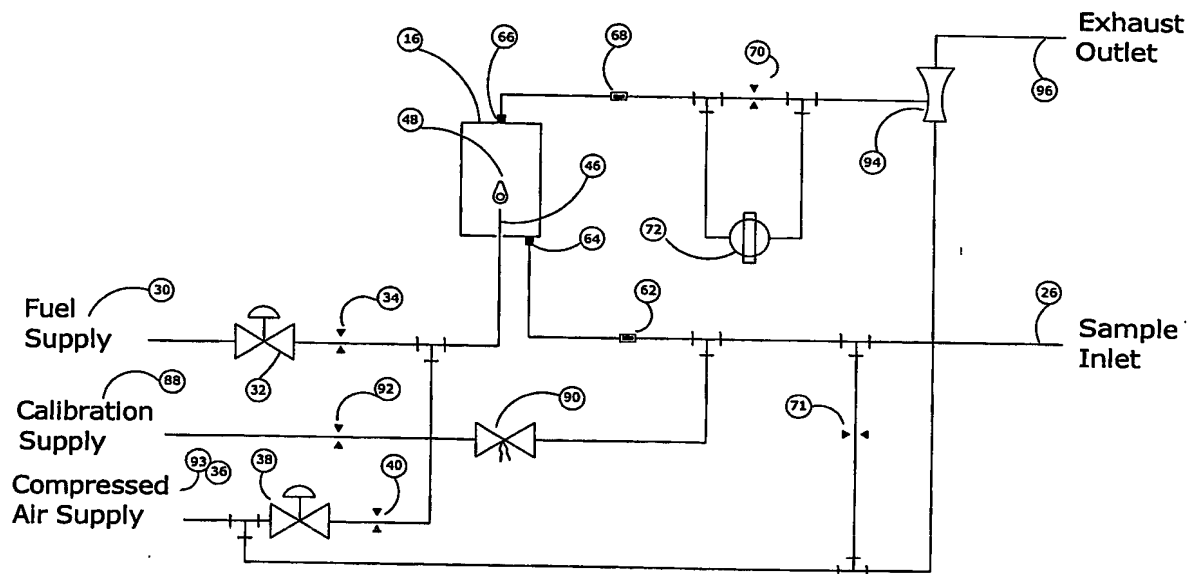
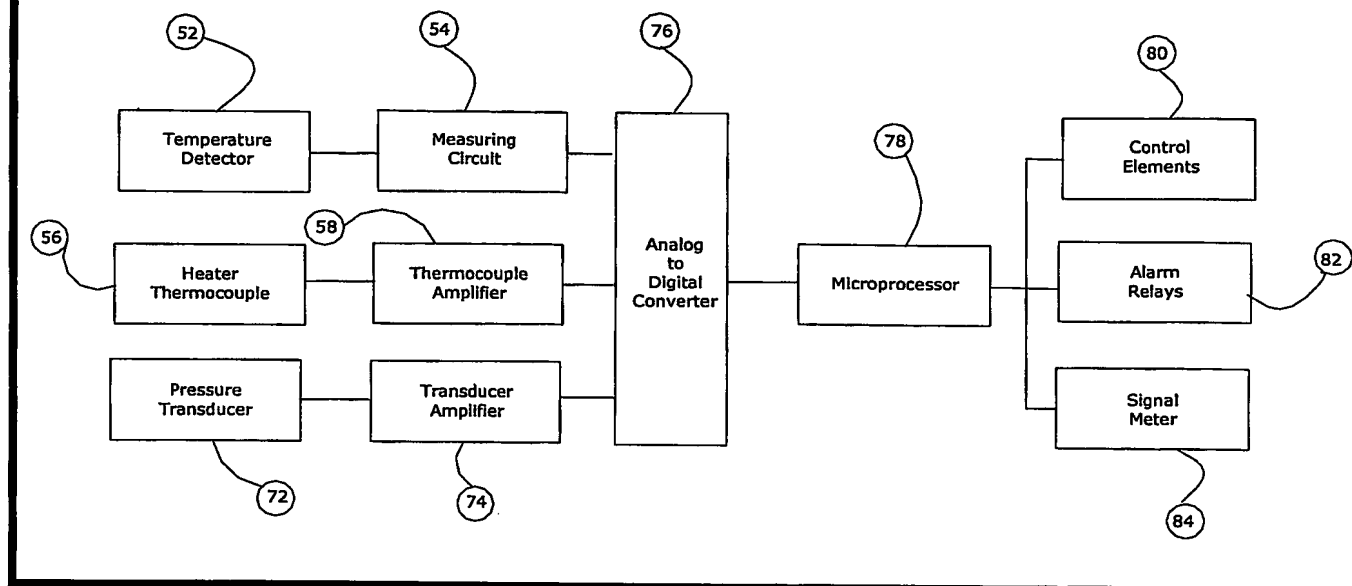


Figure 5



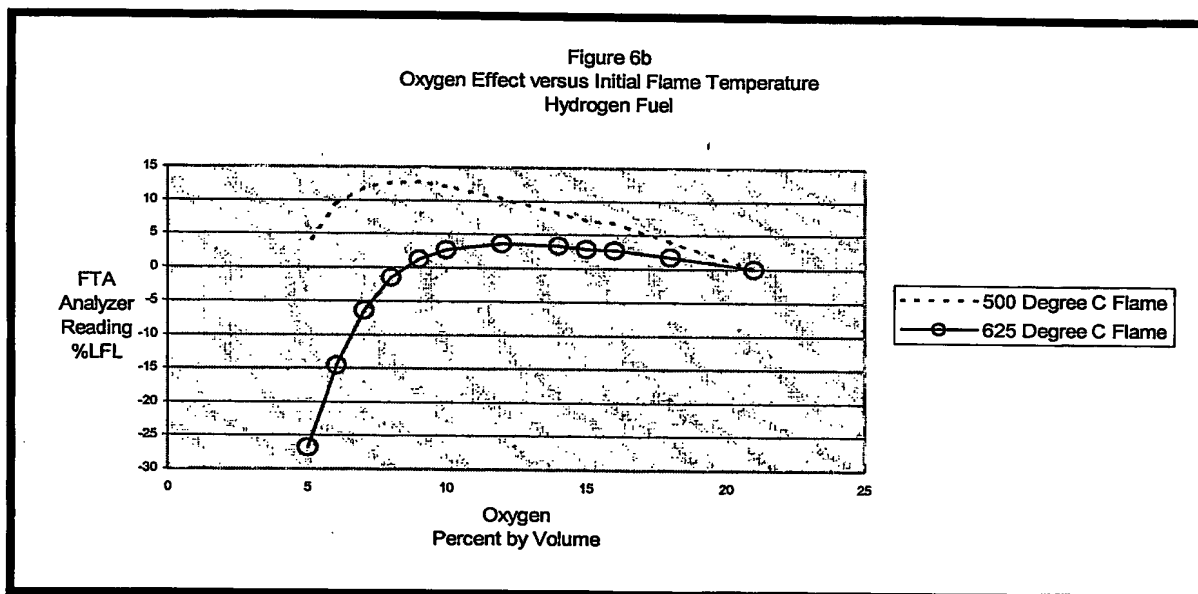
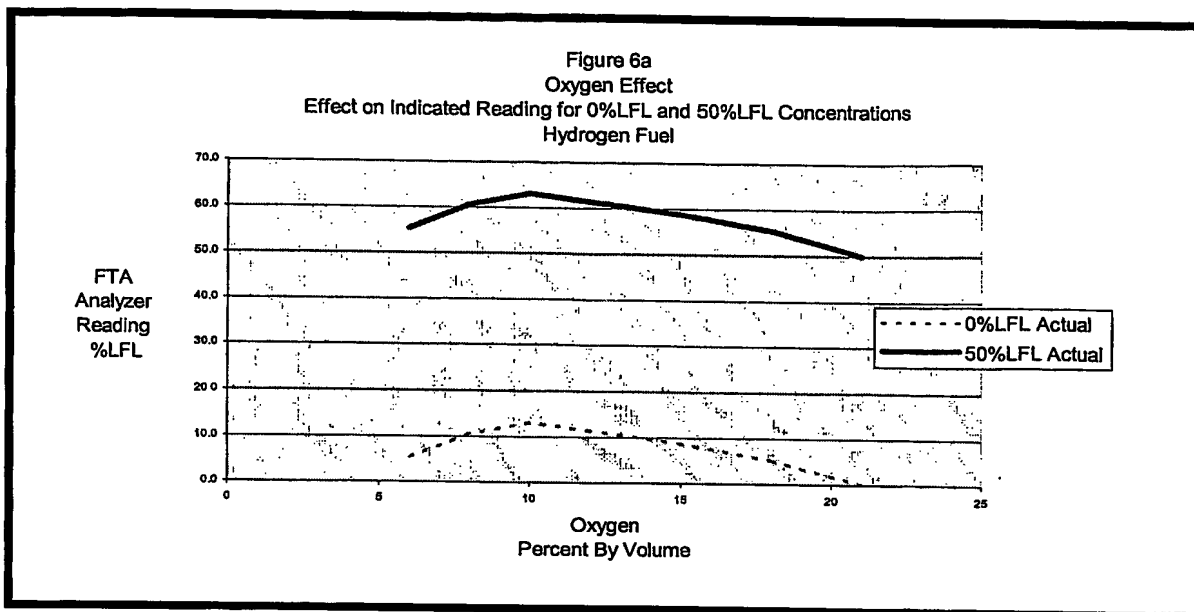


Figure 6c  
Oxygen Effect for Hydrogen-Oxygen Fuel Mixtures

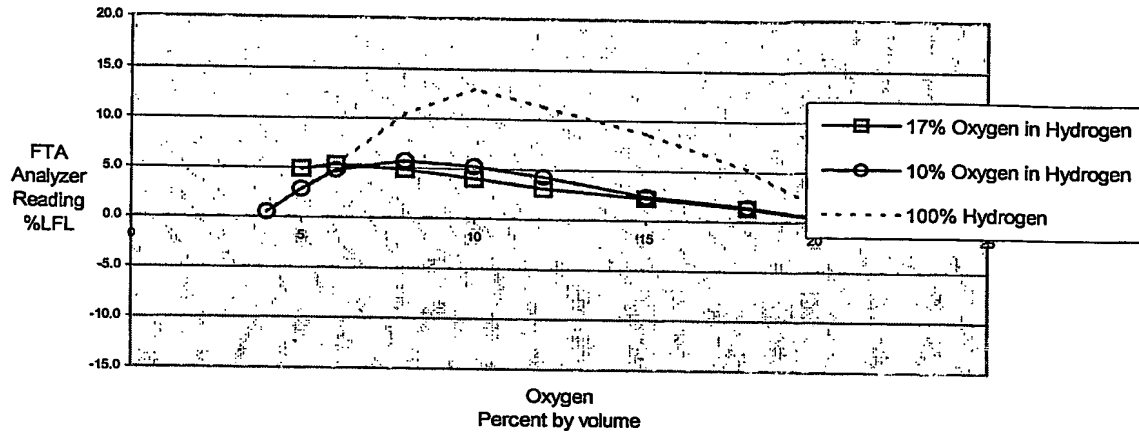
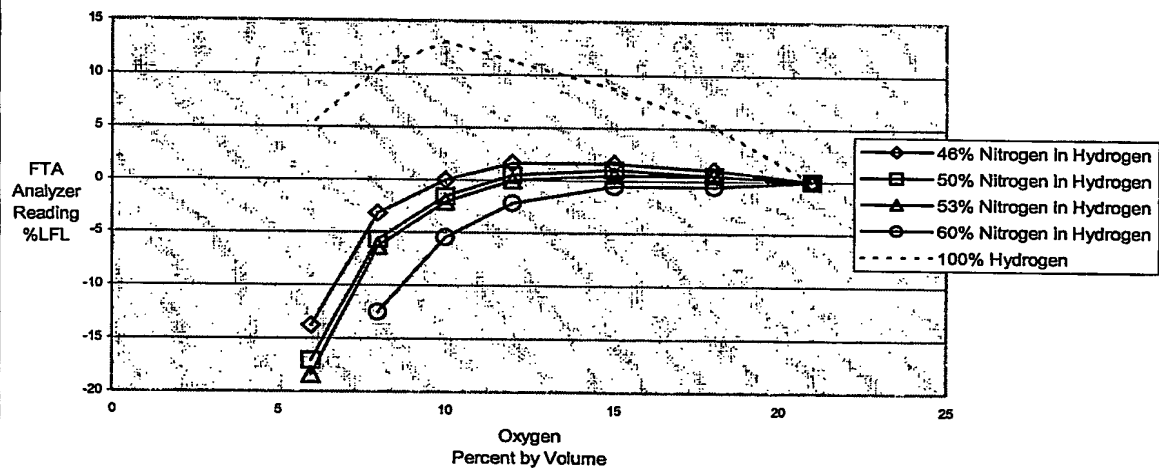


Figure 6d  
Oxygen Effect for Hydrogen-Nitrogen Fuel Mixtures



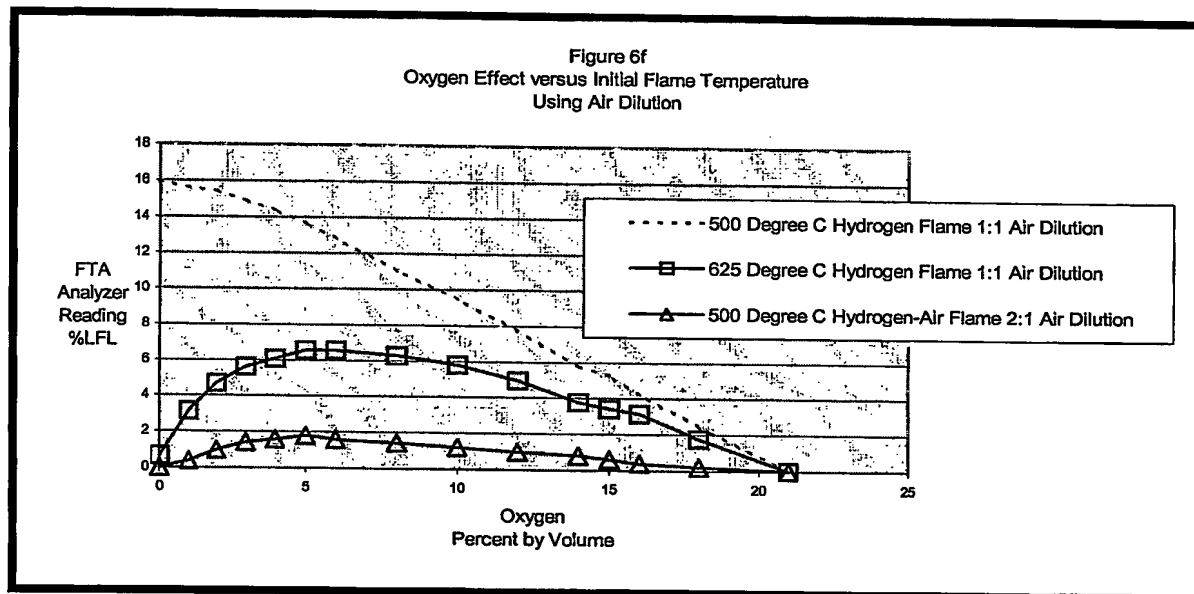
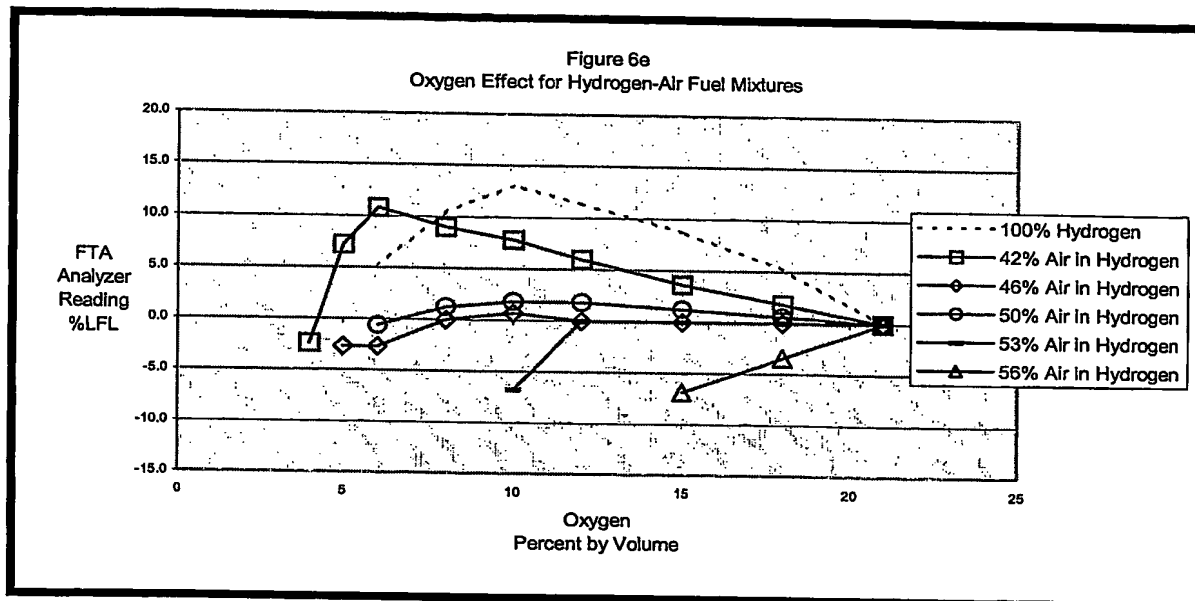


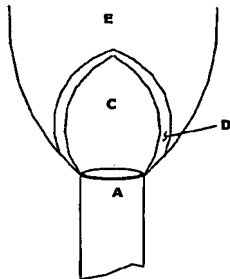
Figure 6g

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## Oxygen Effect and Signal Strength for Various Initial Flame Temperatures

Flame Temperature in 21% Oxygen	349	400	449	501	549	599	627	649	702	726	750	776
Reading Shift, %LFL, at 10% Oxygen	14	15	13	12	10	5	2	0	-10	-16	-23	-31
Loss of Signal Strength	-36%	-18%	-9%	-2%	0%	-1%	-4%	-6%	-12%	-15%	-19%	-24%

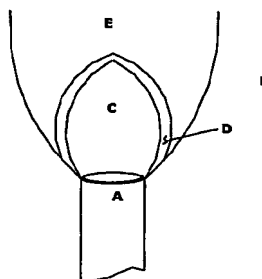
Figure 7a



Representation of **prior art FTA flame** with oxygen effect.

Zone A - hot tip of burner where pure hydrogen fuel undergoes preheating.  
 Zone B - ignition zone does not occur because no oxygen is present in the hydrogen fuel  
 Zone C - inner core of flame consisting of unburned gas  
 Zone D - main reaction zone where oxygen diffuses inward from the sample to support combustion. Zone D is dependent on rate of oxygen diffusion, which in turn varies as the concentration of oxygen in the sample varies.  
 Zone E - Products of combustion  
 Zone G - Zone containing sample, which can have a varying concentration of oxygen.

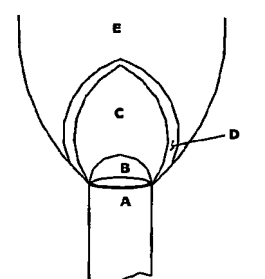
Figure 7b



Representation of **improved FID flame** with hydrogen-nitrogen fuel to prevent oxygen dependency.

Zone A - hot tip of burner where mixture of hydrogen, nitrogen and sample undergoes preheating.  
 Zone B - Ignition zone does not occur because insufficient oxygen is present in the sample-hydrogen-nitrogen mixture  
 Zone C - Inner core of flame consisting of unburned gas  
 Zone D - main reaction zone where oxygen diffuses inward to support combustion  
 Zone E - Products of combustion  
 Zone F - Oxygen rich zone containing combustion air

Figure 7c



Representation of **improved FTA flame** with hydrogen-air fuel to prevent oxygen effect.

Zone A - hot tip of burner where mixture of hydrogen, nitrogen and sample undergoes preheating.  
 Zone B - Ignition zone which always occurs because oxygen is present in the hydrogen-air mixture. This zone stabilizes the flame.  
 Zone C - Inner core of flame consisting of unburned gas  
 Zone D - main reaction zone where oxygen diffuses inward from the sample to support combustion  
 Zone E - Products of combustion  
 Zone G - Zone containing sample with a varying concentration of oxygen